United Nations A/61/1028

General Assembly

Distr.: General
15 August 2007

Original: English

Sixty-first session
Agenda item 84

Verification in all its aspects, including the role of the United Nations in the field of verification

Note by the Secretary-General*

The Secretary-General has the honour to submit herewith the report of the Panel of Government Experts on verification in all its aspects, including the role of the United Nations in the field of verification. The Panel was appointed in pursuance of paragraph 3 of General Assembly resolution 59/60 of 3 December 2004.

* The document was submitted late to conference services without the explanation required under paragraph 8 of General Assembly resolution 53/208 B, by which the Assembly decided that, if a document is submitted late, the reason should be included in a footnote to the document.

07-46049 (E) 100907

Report of the Panel of Government Experts on verification in all its aspects, including the role of the United Nations in the field of verification

Summary

The international security environment has changed considerably over the past decade, with corresponding implications for non-proliferation, arms control, disarmament and confidence-building measures. These changes have also had implications for verification in general and led to a greater emphasis on compliance with obligations under existing treaties, agreements and commitments. They have also fostered a greater realization of the need to respond to non-compliance with arrangements in force and to build national capacities to implement them more fully and effectively.

Pursuant to the request made by the General Assembly in its resolution 59/60, the Secretary-General established a panel of government experts to prepare a study on verification in all its aspects, including the role of the United Nations in the field of verification. Two previous United Nations expert reports on the subject, in 1990 and 1995, dealt comprehensively with the issue. Building on those reports, the current Panel approaches the issue selectively, looking at what has changed in 10 years and discerning new trends and developments.

The experts examine the purpose of verification; its conceptual evolution; developing methods, procedures and technologies; and verification and compliance mechanisms. The Panel offers 21 generic recommendations for active consideration by Member States, treaty bodies or the United Nations.

Contents

		Paragraphs	Page
	Foreword by the Secretary-General		3
	Letter of transmittal		4
	List of presentations made by verification analysts and practitioners from the United Nations, its Member States and its family of organizations, from non-governmental research institutions and associations		7
I.	Introduction	1–8	9
II.	Purpose of verification	9–28	10
III.	Evolution of the concept of verification since 1995	29–40	14
IV.	Verification methods, procedures and technologies	41–57	16
V.	Verification and compliance mechanisms	58–71	19
VI.	Final recommendation	72	21

Foreword by the Secretary-General

Verification of compliance went hand in glove during the 1990s, with the remarkable gains made in multilateral disarmament and arms control. A new era of global cooperation in ensuring the effective implementation of treaties seemed to be dawning — the Chemical Weapons Convention set out the most far-reaching verification arrangements ever made with regard to a disarmament agreement, and the establishment of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty initiated the development of a worldwide network of monitoring stations and a global communications system that was unprecedented in scope. Two comprehensive United Nations government expert reports on verification in 1990 and 1995 underscored this trend. Verification was accepted as a tool to reinforce disarmament agreements, thus enhancing national and international peace and security.

However, the tide turned in the first years of this century, and the famous catch-phrase of the cold war, "trust and verify", became tarnished. It is thus encouraging to see that the present report, the third in the series, acknowledges a shift away from that perception. The report upholds the need for verification of arms agreements, treaties and other commitments and highlights the responsibility of States to comply with those commitments. It also recognizes how rapidly technical advances are being applied to verification and compliance commitments. It stresses that new areas of international cooperation, such as controls on the illicit trade in small arms and lights weapons, call for fresh thinking about monitoring of compliance at the regional and subregional levels.

The experts do not propose specific solutions for the verification of international arms norms, but they do suggest that solutions can be found. Those solutions could generate greater levels of confidence among States. I share the hope expressed in the final recommendation made by the Panel that Member States will consider actively how to further develop the 21 recommendations made by the Panel. The focus of the purpose remains *trust* among States. That trust can be built and strengthened through effective verification, compliance and monitoring.

Letter of transmittal

[30 July 2007]

I have the honour to submit herewith the report of the Panel of Government Experts on verification in all its aspects, including the role of the United Nations in the field of verification. The Panel was appointed in pursuance of paragraph 3 of General Assembly resolution 59/60 of 3 December 2004. The experts appointed to the Panel are listed at the end of the present letter.

As Chairman of the Panel, I am pleased to inform you that consensus was reached on the report. Arriving at consensus was achieved through a combination of face-to-face meetings, electronic communications and telephonic exchanges — an approach that afforded additional time and opportunity to pursue consultations and discussions. These latter permitted the Panel to iron out last divergences on the text.

The Panel's work

The Panel held three sessions last year: 30 January-3 February 2006 in New York; 8-12 May 2006 in Geneva; and 7-11 August 2006 in New York.

The Panel's deliberations were enriched by presentations made by several of its members in their respective areas of verification and compliance expertise. Throughout the sessions, the Panel also heard presentations by verification analysts and practitioners from within the United Nations, its Member States and its family of organizations, as well as from non-governmental research institutes and associations. The Panel wishes to express its gratitude to these experts for their contributions. A list of the presentations is annexed to the present letter.

On the last day of its third session, the Panel found that more time was needed to continue work on the draft text. Much solid work had been achieved and it was agreed that the end of the formal face-to-face meetings should not spell the conclusion of all efforts to reach a consensus text. Consequently, the Panel entrusted the Chairman with the task of continuing consultations through electronic means to resolve the outstanding differences on the text during the time before a report would formally have to be submitted.

On 16 October 2006, upon the request of the Chairperson of the First Committee of the General Assembly, I gave an interim report on the work of the Panel to the Committee. In it, I explained to members of the First Committee that, though the time allotted for formal sessions had expired, the Panel was still resolved to continue working towards a consensus report, particularly given the important contribution such a consensus could make to establishing a common view on the role of verification with respect to disarmament and arms control agreements.

On 6 December 2006, the General Assembly, by decision 61/514, encouraged the Panel to bring its work to an agreed conclusion as soon as possible, and decided to include the item on the agenda of the next session of the Assembly. On 27 June 2007, the Panel reached agreement on the text which is attached to this letter of transmittal. I would point out that the substantive work of the Panel was conducted during 2006. The content of the report therefore reflects issues relating to verification as of August 2006.

Throughout the Panel's deliberations in 2006 — during the formal meetings as well as the subsequent procedure of electronic consultations — the members of the Panel were strongly supported by the Under-Secretary-General for Disarmament Affairs. The Panel members are grateful for his repeated reminders to the Panel of the timeliness of its work and his continuing encouragement to reach an agreed conclusion.

The Panel wishes also to express appreciation for the invaluable contribution of three verification experts, from both within and outside the United Nations system, who served as consultants to the Panel: the Director of the United Nations Institute for Disarmament Research; the Deputy Director of the Verification Research, Training and Information Centre; and the Director of the Canadian Centre for Treaty Compliance at Carleton University in Ottawa. The Panel also wishes to express appreciation to the Chief of the Monitoring, Database and Information Branch of the Office for Disarmament Affairs, who served as Secretary of the Group, and to other Secretariat officials who assisted the Panel with their expertise.

(*Signed*) John **Barrett**
Chairman of the Panel

The government experts appointed to the Panel were the following:

Masahiko Asada
Professor of International Law
Kyoto University Graduate School of Law
Kyoto, Japan

John Barrett
Director-General
Strategic Planning Bureau
Department of Foreign Affairs and International Trade of Canada
Ottawa

Volodymyr Belashov
Director
Directorate General for Arms Control and Military-Technical Cooperation
Ministry of Foreign Affairs of Ukraine
Kiev

Michael Biontino
Head of the Conventional Arms Control and Verification Unit
Ministry of Foreign Affairs of Germany
Berlin

Choi Hong-ghi
Counsellor
Permanent Mission of the Republic of Korea to the United Nations
New York

Machiel Combrink
Deputy Director, Nuclear and Non-Proliferation
Department of Foreign Affairs of South Africa
Pretoria

Philippe Errera
Deputy Director, Centre for Analysis and Policy Planning
Ministry of Foreign Affairs of France
Paris

Sally K. Horn
Senior Adviser to the Assistant Secretary
Bureau of Verification, Compliance and Implementation
United States Department of State
Washington, D.C.

Samantha Job
First Secretary
Permanent Mission of the United Kingdom of Great Britain
and Northern Ireland to the United Nations
New York

Pablo Macedo
Deputy Permanent Representative of Mexico to the United Nations
Office in Geneva
Geneva

R. Carlos Sersale di Cerisano
Ambassador of Argentina to South Africa
Pretoria

Björn Skala
Ambassador
Ministry for Foreign Affairs of Sweden
Stockholm

Chuka Udedibia
Minister
Permanent Mission of Nigeria to the United Nations
New York

Victor L. Vasiliev
Deputy Director, Department of International Organizations
Ministry of Foreign Affairs of the Russian Federation
Moscow

Aruni Wijewardane
Permanent Representative of Sri Lanka to the United Nations
Office at Vienna
Vienna

Zhang Yan
Director-General, Department of Arms Control and Disarmament
Ministry of Foreign Affairs of China
Beijing

List of presentations made by verification analysts and practitioners from the United Nations, its Member States and its family of organizations, from non-governmental research institutions and associations

Beck, Volker. Coordinator of the 1540 (2004) experts. *Security Council resolution 1540 (2004).*

Bosch, Olivia. Senior Research Fellow, International Security Programme at Chatham House (Royal Institute of International Affairs), London. *Issues of non-proliferation of weapons of mass destruction, in particular on Security Council resolution 1540 (2004).*

Buchanan, Ewen. Public Information Officer, United Nations Monitoring, Verification and Inspection Commission. *United Nations verification: Iraq weapons of mass destruction.*

Buisson, Mike. Member of the Group of Experts monitoring the implementation of Security Council resolution 1654 (2006). *Sanctions and arms embargo.*

Carle, Christophe. Deputy Director, United Nations Institute for Disarmament Research, United Nations Office at Geneva. *Missiles.*

Cassandra, Michael. Chief, Monitoring, Database and Information Branch, Department for Disarmament Affairs. *The work of the Department for Disarmament Affairs in the area of verification.*

DeSutter, Paula A. United States Assistant Secretary of State for Verification, Compliance and Implementation. *The Libya model: strategic commitment and verification.*

Ghita-Duminica, Adrian. Senior Adviser, Industry, Canadian National Authority. *Verification through routine on-site inspections at industrial facilities under the Chemical Weapons Convention: views of a former inspector.*

Gizowski, Sylwin. Strategic Coordination and Planning Officer, Office of the Executive Secretary, Preparatory Commission of the Comprehensive Nuclear-Test-Ban Treaty Organization. *International monitoring system.*

Goldschmidt, Pierre. Member of the Board of Directors and of the Executive Committee of the Association Vinçotte Nucléaire, Visiting Scholar with Carnegie Endowment for International Peace and former Deputy Director General, Head of the Department of Safeguards, International Atomic Energy Agency. *Nuclear issues.*

Krepon, Michael. Co-founder of the Henry L. Stimson Center, Washington, D.C. *Cooperative threat reduction.*

McDonald, Glenn. Yearbook Coordinator, Senior Researcher, Small Arms Survey. *Verification, including monitoring, reporting, inspection and confidence-building aspects which apply to small arms agreements.*

Reeps, Horst. Director of Verification, Organization for the Prohibition of Chemical Weapons. *The verification process.*

Smithson, Amy. Senior Fellow at Centre for Strategic and International Studies, Washington, D.C. *Issues related to chemical and biological weapons proliferation.*

Stoffer, Howard. Head of Administration and Information, Counter-Terrorism Committee Executive Directorate. *Developments in methods, procedures and technologies for verification of compliance in the light of international experiences.*

Wareham, Mary. International Committee to Ban Landmines, former Coordinator of Landmine Monitor. *Development of verification and compliance with the Mine Ban Convention.*

Yehl, Tom. Director of Technology and Assessment, Bureau of Verification, Compliance and Implementation, United States Department of State. *Cooperative methodologies and technologies for verification and compliance assessment.*

Zanders, Jean Pascal. Bio Weapons Prevention Project. *Verification in support of the prevention of the weaponization of disease: challenges and options.*

Zlauvinen, Gustavo. Representative of the Director General of the International Atomic Energy Agency to the United Nations and Director of the New York Office. *Developments at the International Atomic Energy Agency with respect to verification.*

I. Introduction

1. In the 11 years since the last United Nations expert group report on verification (A/50/377), the international security environment has changed considerably, with corresponding implications for non-proliferation, arms control, disarmament and confidence-building measures. Global terrorism has made its baneful impact felt in many States, reinforcing concern about the potential for terrorists to obtain and use chemical, biological, radiological or nuclear weapons. An international clandestine network for the procurement of designs, materials and technologies for nuclear weapons has been discovered. Non-compliance with obligations arising from the Treaty on the Non-Proliferation of Nuclear Weapons and nuclear safeguards agreements has occurred, with one State announcing its withdrawal from the Treaty. Advances in biotechnology and genetics have emerged that have profound implications for the control of biological and toxin weapons. Missile proliferation is also of concern in this context as more States have acquired knowledge and capacity to develop, produce and deploy means of delivery, including missiles, and other unmanned systems that can be used in a destabilizing manner. There is also a growing risk of misuse of dual-use technologies and items.

2. In the area of conventional arms, armed conflicts in various regions have been exacerbated by the illicit transfer from outside sources of certain types of weapons, particularly small arms and light weapons, including weapons of increasing sophistication and destructiveness.

3. Such changes in the international security environment have implications for non-proliferation, arms control and disarmament as well as for confidence-building and verification. In addition, there is growing emphasis on full compliance by all States with their obligations under existing treaties, agreements and commitments, as well as growing realization of the importance of responding to non-compliance[1] and building national capacities to implement those treaties, agreements and commitments more fully and effectively. This has stimulated renewed discussion on the purpose, effectiveness and relevance of verification in its capacity to promote compliance and to deter, detect and help to address non-compliance.

4. Over the past decade, the technical means of verification have continued to evolve, providing a greater range of tools that can be used, including those within the grasp of a wider number of States and organizations. The rapid advancement of information and communications technology, including most notably the Internet, has broadened considerably the availability of relevant information and placed such information within the grasp not only of States and international organizations but also of civil society. It has also led to challenges related to the sheer amount and variable quality of information available. But, in parallel, it has produced major improvements in data gathering, processing, search and retrieval capabilities that have facilitated the identification of information relevant to verification.

5. Advances in remote sensing, including by satellite and aerial means, and their growing commercial availability at reasonable cost, have expanded access to information relevant to verification. Improved sampling and analysing techniques

[1] Unless otherwise indicated, in the context of the present report, the term non-compliance is used in a general sense and not as it is used in any specific treaty.

have furthermore increased the capacity of States to gather relevant information for verification purposes.

6. The experience and accumulated expertise of international agencies, standing verification bodies and bilateral and regional arrangements for verification and monitoring have provided a valuable contribution and have enriched and helped to spur the development of new approaches, methods and technologies for verification. An ever-expanding number of personnel is gaining experience in verification, including as on-site inspectors in various fields, thereby giving more and more States a role in the conduct of verification.

7. Verification also has its constraints. Questions have been raised about the efficacy of verification approaches, technologies and methodologies for detecting non-compliance with certain types of obligations in a timely manner. Recent experience has shown that, in respect of some types of activities, including procurement and development of dual-use items and certain types of weapons, efforts to violate obligations may not be detectable or confirmable as illicit. An appropriate balance must be found between the needs of verification, on the one hand, and legitimate national security and commercial proprietary concerns, on the other hand. The capacity of States to implement their obligations can be inadequate. For example, some States have serious problems in monitoring and implementing legal controls on the activities of individuals and non-governmental entities within their territory.

8. Keeping in mind both the need to avoid duplication of work done by the earlier panels (see A/45/372 and Corr.1 and A/50/379) and General Assembly guidelines on report writing, this report is selective, not exhaustive, in its treatment of verification. Within these parameters, the Panel has sought to focus in particular on what has changed in the decade since the last report and what is different in the international community's approach to, and understanding of, verification, in order to discern new trends and requirements. It includes established verification approaches as well as emerging approaches that support verification. To this end, the Panel has examined the purpose of verification; the evolution of the concept of verification since 1995; verification methods, procedures and technologies; and, verification and compliance mechanisms. Examination of the verification "toolbox" has been undertaken with a view to suggesting areas in which additional work could usefully be pursued. In addition, the Panel has looked at the key factors influencing what States want and expect from verification and how these expectations might be addressed. The overall objective was to produce a report with forward-looking recommendations, which States are invited to explore and examine and to take up in their own right.

II. Purpose of verification

9. Verification is a tool to strengthen international security. It involves the collection, collation and analysis of information in order to make a judgement as to whether a party is complying with its obligations. Such obligations may derive from treaties, agreements or arrangements or from decisions of competent multilateral organs such as the Security Council.

10. Most non-proliferation, arms control and disarmament regimes have been conceived to include formal, legally binding bilateral or multilateral verification

arrangements. Such arrangements set out the procedures, methodologies and technologies for the conduct of verification and for addressing concerns related to parties' activities. More recently, some States also have utilized less formal arrangements.

11. States may develop cooperative verification arrangements either informally or through the establishment of bilateral, multilateral (including regional) or international bodies. In addition, or alternatively, they may use their own national means and methods of verification. Cooperative verification mechanisms can be useful to all States, particularly to those with limited national capacity and resources for conducting their own verification and monitoring activities. Although some forms of participation in verification may be costly, States derive significant security and other benefits from treaty membership.

12. There is no single means of verification applicable to all agreements. Parties to each arrangement, treaty or agreement will select from a range of verification tools the means that they deem necessary, effective and acceptable. Factors that affect the design of verification arrangements include the nature of the obligations and activities to be verified; national security concerns; the risks associated with and the potential impact of non-compliance; the compliance history of the parties involved; the degree of trust between the parties; commercial confidentiality; the benefits and costs of the contemplated means of verification; the availability of alternative or additional resources, including national means and methods of verification; the need to avoid misuse or abuse of verification; and the principles of reciprocity and impartiality. Each State may give different weight to these factors.

13. Multilateral, treaty-bound verification is a desirable goal. It can enhance credibility, encourage universality, bring all participating States together in a common endeavour, help to build transparency and confidence and facilitate compliance. It can also facilitate action, where applicable, by implementation bodies, the General Assembly and the Security Council to bring States parties back into compliance. However, there is a concern that such arrangements may not always be appropriate or feasible.

14. The political will of States to implement non-proliferation, arms control and disarmament obligations and commitments, including confidence-building measures, and to participate in the associated verification arrangements, where applicable, is crucial. It is characterized by the willingness of States to share information, allocate resources, use available verification mechanisms and deal with cases of non-compliance. If provided with sufficient flexibility and sturdiness, the verification arrangements will be better able to meet and withstand crises should they arise.

15. Various international organizations play a role in multilateral monitoring and verification. For example, the International Atomic Energy Agency (IAEA) and the Organization for the Prohibition of Chemical Weapons (OPCW) contribute to increasing effective verification, including by promoting training activities, optimizing the utilization of monitoring and verification resources, maintaining extensive and accessible databases in their respective fields and providing technical and other assistance to participating States to comply fully with their obligations. Additionally, while the Comprehensive Nuclear-Test-Ban Treaty is not in force, work is under way in the Preparatory Commission for the Comprehensive Nuclear-

Test-Ban Treaty Organization to build an international monitoring system and develop on-site inspection procedures.

16. The United Nations has been and is involved in several areas of monitoring and verification. These include investigating prohibited activities through the activities of the United Nations Special Commission (UNSCOM) and the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) in Iraq; investigating allegations of chemical and biological weapons use through the Secretary-General's mechanism; monitoring the implementation of arms embargoes and sanctions authorized by the Security Council; and monitoring and assisting States in the implementation of obligations such as those arising from Security Council resolution 1540 (2004).

17. The United Nations also facilitates the collection, collation and dissemination of the reports on the confidence-building measures under the Biological and Toxin Weapons Convention; the annual submissions to the Register of Conventional Arms; the annual submissions to the United Nations System for the Standardized Reporting of Military Expenditures; the annual reports required under article 7 of the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-personnel Mines and on Their Destruction; data and information, including national reports, on the implementation of the Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons; and reports on confidence-building measures in the field of conventional weapons submitted pursuant to General Assembly resolution 59/92. In addition, the United Nations Institute for Disarmament Research provides information concerning obligations relating to non-proliferation and disarmament treaties, agreements, commitments and their verification.

18. Compliance assessments are an integral element of the verification process. Verification seeks to detect non-compliance, deter would-be non-compliers and build confidence among parties to an agreement. It seeks to detect non-compliance early enough to enable States parties to deal with the situation by bringing the violator back into compliance; counter the security threat presented by the violation; and thereby deny the violator the benefits of non-compliance. Verification also seeks to enhance transparency and openness, thereby building confidence. Verification thus plays a direct role in contributing to international and national security by providing assurances on the compliance of States with their obligations and commitments.

19. The ability to detect and assess accurately non-compliance depends on factors such as the nature of the obligations, the precision of the language by which they are expressed, the monitoring means included in the agreements, the compliance history of the parties and analytic capabilities. The integration of information from various sources and the degree of access that inspectors have to areas of concern will also be factors. While international bodies may be mandated to verify compliance, ultimate responsibility for making compliance assessments rests with States parties.

20. States have the opportunity to demonstrate their compliance by undertaking confidence-building and transparency measures and providing extra information in addition to the basic legal, mandatory requirements. Conversely, States need to consider that suspicions might arise from their non-participation or partial, reluctant involvement in verification activities.

21. In order for verification to deter States from non-compliance, there need to be clear and assured consequences for non-compliant behaviour. When violations are discovered, the goal is to bring the transgressor back into compliance, consistent with the provisions of the relevant treaty and international law, including the Charter of the United Nations.

22. Non-compliance may be inadvertent or deliberate. In the case of inadvertent non-compliance, States may not be fully aware of their obligations or may misinterpret them. In such cases, advice, encouragement and cooperation, including capacity-building, can help bring States back into compliance and prevent further non-compliance.

23. In cases of deliberate non-compliance constituting a direct challenge to the security of other parties, stronger measures are likely to be necessary. A range of different measures could be applied, in accordance with national legislation and consistent with international law, such as seeking clarifications and assurances through provisions of the relevant treaty, diplomatic and other national, regional and multilateral efforts, and consideration and appropriate action by the Security Council, including measures under Chapters VI and VII of the Charter. Consistency in reacting to situations of non-compliance is important in ensuring widespread support and deterring future non-compliance.

Recommendations for section II

Recommendation 1

24. **Non-proliferation, arms control and disarmament treaties, agreements and commitments, when and if appropriate to the circumstances, should be defined in a way such that they can be subject to effective verification.**

Recommendation 2

25. **Verification approaches should be designed to enable the parties to an agreement to monitor compliance, and detect and collect evidence of possible non-compliance, before that non-compliance threatens the core security objectives of the agreement. To the extent that these objectives can be achieved, it is therefore preferable that treaties, agreements and commitments be supported by an appropriately elaborated set of verification procedures and means that take full account of the nature of the agreement and the relationship among the potential parties.**

Recommendation 3

26. **If it is determined by States that verification cannot be achieved with confidence in this fashion, States may wish to consider proceeding with the agreement using other appropriate means.**

Recommendation 4

27. **Analysis could be undertaken of the capability of existing and possible new verification methods to detect significant, deliberate non-compliance or a pattern of non-compliance with obligations.**

Recommendation 5

28. **Further consideration could be given to responses to withdrawal from treaties where the withdrawing party has misused its technology and technology transfers for peaceful purposes to pursue prohibited weapons-related activities, with specific reference to non-compliance, continuing verification and denying violators the benefits of their violations.**

III. Evolution of the concept of verification since 1995

29. The concept of verification has evolved since 1995. The concept discussed by the Panel included broader elements than traditional verification arrangements. The United Nations, including the Security Council, has played an increasing role in activities, including those related to non-State actors, which fall within the ambit of this broader concept of verification.

30. Cooperative threat reduction activities (for example, the 1991 Nunn-Lugar Cooperative Threat Reduction Program and the Global Partnership against the Spread of Weapons and Materials of Mass Destruction) have produced innovative transparency, reporting and verification measures for assessing implementation and compliance. These agreements have been helpful in building international confidence, including by providing publicly available information on their implementation.

31. Transparency measures such as those found in the Vienna Document, the Open Skies Treaty, the Hague Code of Conduct, the Andean Charter for Peace and Security and the Document on Confidence and Security-Building Measures in the Naval Sphere in the Black Sea have been helpful in building confidence and security.

32. Export controls and export licensing practices for dual-use goods and technologies are becoming increasingly important tools. Advances in tracking and tracing shipments and transfers of dual-use items, including the use of authenticated end-use/user and delivery certificates, are helping in the monitoring of compliance with States' obligations to prohibit illicit transfers of controlled goods and to prevent the proliferation of weapons of mass destruction and their means of delivery.

33. Civil society, including industry, the financial sector, the media, academia and non-governmental organizations, is playing an increasing role in raising awareness of non-proliferation, arms control, disarmament and other obligations and commitments, including those relating to sanctions and arms embargoes, as well as confidence-building measures. It is also acting as a resource for informing individual members of society about the implications of such obligations and commitments. It can also provide resources and expertise to States that may need assistance in national implementation.

34. Arms embargoes and sanctions imposed by the Security Council have been used by the international community to curb the illicit inflow, transfer or acquisition of weapons in certain countries or regions, in the interest of international peace, pressing humanitarian considerations or the prevention of human rights violations. The Security Council relies on Member States, regional and international organizations and its own bodies and mechanisms to monitor the implementation of

embargoes and sanctions. Arms embargoes and sanctions work most effectively when all States have the capacity and will to comply with them fully and there is confidence that all States are complying with the obligations they impose. Low-tech monitoring technologies and methodologies are particularly useful in monitoring embargoes and sanctions. In this regard, certain non-governmental organizations and civil society have played an informal role in certain cases in identifying the location of clandestine holdings and illicit transfers of conventional arms.

35. Security Council resolution 1540 (2004) requires all States to implement and enforce the necessary national measures, such as penal and administrative legislation, export controls, and border and customs controls, to prevent the proliferation of nuclear, chemical and biological weapons and their means of delivery. The Security Council, including through its 1540 (2004) Committee, has devised innovative ways to monitor compliance with these obligations, including national reporting. The implementation of resolution 1540 (2004) has revealed a lack of capacity in some States to execute their obligations, even when they are willing to do so. While the 1540 (2004) Committee oversees the implementation of the resolution, there is still a need to assist some States to enable them to be aware of and to meet their obligations.

Recommendations for section III

Recommendation 6

36. **Those in a position to do so might consider assisting relevant States and regional groups in developing the legal, institutional and operational capacity to implement their obligations under Security Council embargoes and sanctions. In this regard, the utilization and continued development of effective, low-tech monitoring technologies and methodologies should be fostered, as well as the strengthening of States' tracking of illegal arms flows and enhanced national controls on imports, exports, financial transactions and brokering relating to illicit arms transfers.**

Recommendation 7

37. **The United Nations could encourage improved coordination among Member States and regional organizations and help affected States to participate actively in monitoring and verifying compliance with arms embargoes and sanctions.**

Recommendation 8

38. **States Members of the United Nations, in line with Security Council resolution 1540 (2004), should consider the kind of practical assistance they can provide, particularly in the areas of reporting and capacity-building, to help States implement their non-proliferation obligations.**

Recommendation 9

39. **Private donors, foundations, non-governmental organizations and international organizations could assist States in ensuring that civil society is aware of its obligations.**

Recommendation 10

40. **Partnerships between or among States, the United Nations, other international organizations and civil society to help build capacity for national implementation of States' obligations, including through research and identification of appropriate legislative models and best practices, might be further encouraged, where appropriate.**

IV. Verification methods, procedures and technologies

41. Significant developments in verification methods, procedures and technologies have occurred since 1995, serving to increase confidence in the verification process by enhancing flexibility, accuracy, reliability, effectiveness and range. Important practical lessons have been derived from the verification experience.

42. The range of verification techniques and tools has expanded as a result of verification practice and technological developments. Experience has shown that a holistic and multilayered approach is useful to overcome the limitations inherent in individual tools.

43. The availability of improved technologies and methodologies, together with practical experience, has influenced the refinement of existing verification tools and the development of new ones. Verification procedures, such as data mining and interviewing personnel, have proved useful. Advances in data collection, collation, recording and transmission have increased efficiency and reduced costs. States' declarations can now be prepared in electronic format and submitted securely online. Remote monitoring of sensitive facilities is now common practice. The use of satellite observation, aerial overflights — such as those operated under the Open Skies Treaty — and data capture technologies, such as optical cameras, has evolved and is becoming more refined as well as more commonplace.

44. On-site inspection has been enhanced through improvements in observation, sampling, recording and analysis technologies. These include wide-area sampling, portable agent detectors and high-resolution trace analysis that enable minute traces of illicit substances to be detected and identified. Decisions on follow-up measurements and questions can in some instances be made on the spot, enhancing the timeliness, accuracy and cost-effectiveness of inspections.

45. Challenge or special on-site inspections are a potentially useful tool to inspect undeclared sites and facilities. They can increase the risk of detection and the costs of concealing non-compliant activities, and thus may help to deter non-compliance. Such an instrument is found in different verification regimes. For example, it formed an integral part of the confidence- and security-building measures agreed to in the 1986 Stockholm Document for participating States of what was the then Conference on Security and Cooperation in Europe (now OSCE), followed by the Treaty on Conventional Armed Forces in Europe and the Vienna Document 1992. The Chemical Weapons Convention has provisions for short-notice on-site inspections, anytime and anywhere without the right of refusal. The Comprehensive Nuclear-Test-Ban Treaty, while not in force, contains challenge on-site inspection provisions. IAEA special inspections offer the possibility of inspecting undeclared sites, although it would need the consent of the State concerned for practical implementation. A new development in this area is complementary access under the

additional protocol to the safeguards agreements with IAEA. Several bilateral and regional treaties also include provision for challenge inspections. In some agreements and arrangements, challenge inspections are practised frequently as part of the normal confidence-building atmosphere; in others they are treated as highly sensitive instruments and are hardly, if ever, used.

46. Notwithstanding their potential benefits, the degree to which these procedures can help to detect non-compliance depends on the willingness of States to utilize them and the ability to identify locations of concern in a timely manner, to arrive at them before all indications of violation are eliminated and to have sufficient, unimpeded access at those locations, including for sampling, interviewing and document review as appropriate. As a practical matter, there may well be limitations in all these areas and much will depend on circumstances.

47. Technological advances have improved the breadth, availability and quality of information from open sources. A considerable amount of information pertinent to verification is now publicly available on websites, in published form, from commercial sources, including satellites, and from civil society. Data processing has also aided the development of information management systems. For example, integrated data management systems such as those developed by UNMOVIC and used by OPCW can, inter alia, manage State declarations, maps, satellite imagery, on-site inspection reports and sampling reports and provide Intranet, archival and search facilities.

48. International organizations with verification responsibilities have worked together, notably in multidisciplinary teams of inspectors. Cooperation with States has also proved useful to multilateral verification bodies when the provision of information and data from national means has helped the latter to better pinpoint and refine their investigative work in verifying compliance with Security Council resolutions concerning weapons of mass destruction and their means of delivery. For example, satellite imagery and other data have been provided to relevant bodies, including OPCW, IAEA and, in the case of Iraq, UNSCOM/UNMOVIC, by a number of States, as appropriate.

49. There also may be potential for beneficial synergies between verification technology and non-verification applications. For example, the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization is establishing the International Monitoring System, which feeds data into an international data centre for analysis and distribution to member States. Such verification data may also be useful in civil, environmental, disaster management and other scientific applications.

50. In short, one of the most significant changes in verification since the end of the cold war is the growing experience and familiarity of States — and of experts working within States or in international multidisciplinary teams — with verification. For example, bilateral experiences of the United States, the Russian Federation and the Former Soviet Union, the inspections and evaluations conducted bilaterally and multinationally in the Euro-Atlantic region and the experience of the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials have in their respective ways contributed to a considerable pool of verification knowledge, methods and expertise from which to draw.

51. Regarding the illicit transfer of conventional weapons, there are important challenges for States, particularly related to their tracking of illicit cross-border movement of arms, lack of transparency and reporting, the monitoring of financial activities linked to illicit trafficking and brokering in arms, and appropriate domestic legislation and enforcement capacity.

52. Advances in the availability of low-tech tools, such as aerial and cooperative monitoring, methodologies and synergies, give more States an opportunity to play an active and meaningful role, thereby giving them a greater stake in verification as a means of addressing their security.

Recommendations for section IV

Recommendation 11

53. **States might usefully examine the lessons learned from past verification experiences, including, the use of inspections, interviews, data mining, multidisciplinary approaches, teams and training.**

Recommendation 12

54. **States should consider practically how they might go about handling challenge inspections at sensitive sites in order to manage access in a way that builds confidence that the process can demonstrate compliance, while preventing disclosure of confidential information and data not related to the obligation at hand. This could be done for example through training or table-top exercises and mock inspections with or without involvement of international organizations or other States parties.**

Recommendation 13

55. **There may be scope for further cooperation between and among States and standing verification mechanisms of relevant international organizations to identify potential synergies and collaborative possibilities.**

Recommendation 14

56. **Changes in the international security environment can have implications for what States need in their verification toolbox. The creation of new or expanded obligations may require different or new methodologies and techniques (such as, for example, environmental sampling, open-source analysis, interviewing personnel and informal monitoring by civil society). States in a position to do so should continue to research new verification methods and technologies to meet today's challenges and obligations.**

Recommendation 15

57. **States in a position to do so may wish to consider how best to assist other States in identifying, acquiring and using those verification and monitoring techniques, technologies and methodologies, in particular low-tech, that are best suited to their particular security needs. This could be particularly useful in the area of the illicit transfer of conventional weapons.**

V. Verification and compliance mechanisms

58. Responsibility to improve verification and compliance mechanisms lies, quite properly, with the States that have undertaken treaty obligations, freely committed themselves to constraints in armaments and to disarmament activities, or have been obligated by Security Council resolutions. States acting collectively in their capacity as members of a particular treaty or regime, and subject to their internal ratification procedures, have the authority to change, improve and deepen verification or introduce new methods, technologies and measures for that regime.

59. One mechanism comes directly under the auspices of the United Nations — that is, the Secretary-General's mechanism, which is an important potential tool for investigating and verifying the possible use of chemical or biological weapons.

60. By its resolution 42/37 C, the General Assembly requested the Secretary-General to establish a mechanism to investigate the alleged use of chemical or biological weapons, and in that context requested him to further develop technical guidelines and procedures for such investigations, and to compile and maintain a list of relevant experts and laboratories. Following the adoption of Security Council resolution 620 (1988), the Assembly, by resolution 45/57 C, endorsed the ensuing proposals to operationalize the mechanism, including those authorizing the Secretary-General to update it periodically. This mechanism has not been updated as a whole since 1989, although there has been some revision of the list of experts and laboratories. It is unclear whether it would now be able to work effectively if the Secretary-General were called upon to investigate allegations of chemical or biological weapons use. There have been no exercises or operational/logistical planning to ensure that the Secretary-General could in fact send an investigative team of highly trained inspectors in a moment of crisis or need.

61. Standing detailed procedures for the investigation of alleged chemical weapons use have been developed by OPCW for States parties to the Chemical Weapons Convention since 1997. The United Nations and OPCW subsequently concluded an agreement whereby the Secretary-General of the United Nations may request OPCW to investigate alleged use by States not parties to the Convention or territories not controlled by States parties (see General Assembly resolution 55/283).

62. States individually and on a regional basis, as well as OPCW and other international organizations, have taken and are taking steps to improve their ability to investigate chemical and biological weapons use. The Panel has considered the value of taking advantage of existing and planned national and regional capabilities and synergies and greater coordination among international organizations with a view to avoiding unnecessary duplication of effort.

63. Ever-increasing obligations have increased reporting requirements. Some States have difficulties in coping with the reporting burden. Simplification of reporting forms and electronic formats have gone some way in reducing the burden. At the same time, increased reporting requirements have provided more information from States that needs to be collated, disseminated, analysed and verified. Much of the information required is available from open sources, such as the Internet and published government reports, but there are constraints on the capacity of the United Nations to gather and process such information.

64. Regional and bilateral arrangements and organizations can play a role in promoting compliance and detecting non-compliance. Such bodies include regional organizations involved in implementing and monitoring compliance with nuclear-weapon-free zone agreements; and bilateral bodies such as those established by the various United States/Russian Federation nuclear arms control agreements, as well as the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials and the European Atomic Energy Community. They may also be especially useful in investigating suspicious activities within their region, such as outbreaks of infectious disease or attempts to procure materials or components related to weapons of mass destruction. The authority under which such regional bodies or groups of States act may be provided by Security Council resolutions or through regional agreements.

65. Finally, with a few exceptions, multilateral and regional verification and implementation organizations have to date cooperated only sporadically, despite having formal agreements that permit and encourage cooperation. Part of this is due to their different mandates and responsibilities. As improvements continue in monitoring and remote-sensing technologies, data-gathering and processing, environmental techniques and so forth, there is greater scope for one organization's work to be of use to another, even if the specific mandates are different.

Recommendations for section V

Recommendation 16

66. **In the context of General Assembly resolutions 42/37 C and 45/57 C, States could consider ways in which they could contribute to making the Secretary-General's mechanism to investigate alleged use of chemical or biological weapons more operational and cost-effective through national measures.**

Recommendation 17

67. **Consideration should be given to strengthening ties and establishing appropriate standing arrangements with international organizations, including OPCW, States and regional bodies, so as to build upon and make use of their relevant investigative capabilities and make the mechanism more operational and cost-effective.**

Recommendation 18

68. **States that have not done so should consider providing the names of experts and/or laboratories to facilitate the updating of the relevant lists.**

Recommendation 19

69. **States could continue to explore the synergies that may exist in the area of techniques and methodologies of monitoring and verification and in addressing situations relating to compliance and non-compliance.**

Recommendation 20

70. **International organizations mandated to collect information from States in support of monitoring States' compliance with obligations might consider**

ways and means of alleviating or mitigating the overlap, as well as of improving the ways in which data are collected and disseminated to States.

Recommendation 21

71. **Bilateral and regional arrangements could be encouraged to play a role, where appropriate, in promoting compliance, building confidence and detecting, assessing and responding to non-compliance.**

VI. Final recommendation

72. **The panel recommends that States Members of the United Nations give active consideration to the recommendations of this report and to how they might, acting singly or in concert with other States, take up any of the recommendations for development. They could also be subject to further consideration under the respective treaties or by the appropriate United Nations body or group.**